



**THE IMPACT OF COALITION
MOVEMENTS ON AIRLIFT PROJECTIONS**

GRADUATE RESEARCH PROJECT

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AFIT/ILS/ENS/11-04

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Abstract

Contingency operations in Central Command will continue into the foreseeable future. The solicitation of multinational participation in these operations pursuant to U.S. National Security Strategy objectives comes with a cost: The logistics burden of multinational operations typically falls on the Department of Defense. As a primary provider of mobility airlift, the United States Transportation Command is critical to operational logistics, including coalition support. With the high likelihood of sustained/increased U.S. support, mission success requires coalition logistics/airlift needs to be included in USTRANSCOM planning models. As a source of historic airlift information, Time Phased Force Deployment Data is a key input to USTRANSCOM models.

Comparing historic coalition movement data provided by the Central Command Coalition Coordination Center against the TPFDD for the same period, this study investigates the accuracy of USTRANSCOM studies in light of airlift requirements of coalition partners. The subsequent analysis indicates that current studies do not account for coalition requirements. Consequently, it is suggested that USTRANSCOM take an approach to tracking coalition airlift in accordance with existing doctrine. That approach should extend organizations, structures and systems (use to ensure accurate U.S. airlift tracking) to coalition operations, thereby assuring use of a complete airlift picture to predict future requirements.

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*To My Wife and Sons
I Love*

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Major Todd M. Jensen

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THE IMPACT OF COALITION MOVEMENTS ON AIRLIFT PROJECTIONS

I. Introduction

Background and Motivation

Joint Publication 4-08, Joint Doctrine for Logistic Support of Multinational Operations explains: “Logistic planning of multinational operations poses considerable challenges. Realistically, only a few nations can logistically support themselves in every operational phase: deployment; sustainment; and redeployment/termination. Planning multinational support arrangements to ease national logistic burdens and to make logistic support more operationally effective and efficient is a key planning objective” (Department of Defense, 2002). In many cases, easing national logistic burdens of coalition partners results in the creation of an additional burden for the United States. As the Department of Defense’s process owner for transportation, United States Transportation Command (USTRANSCOM) is charged with (among other things) shouldering that additional burden in the form of airlift or air mobility assets. According to USTRANSCOM, however, programmatic mobility studies have historically only addressed U.S. deployment requirements. The result is the potential for these unknown coalition requirements to threaten the ability to provide rapid global mobility, thereby jeopardizing the Geographic Combatant Commander’s (GCC) ability to meet operational requirements.

The simple solution to the problem would appear to be requiring all participant coalition members to provide their own airlift and air mobility support, thereby removing

their required movement footprint from the TRANSCOM scope. Yet the political and operational benefits of coalition war fighting are many. Joint Publication (JP) 3-16 suggests that coalition partners quickly become diplomatic representatives capable of promoting common interests to regional countries (Department of Defense, 2007). These military representatives are a critical component to the synchronization of both multinational military and nonmilitary objectives alike. By multiplying the strength and will of like-minded countries and ideals, coalition action bolsters the legitimacy of U.S. intentions and provides access to regions and regional assets that might otherwise be unavailable. As a result, coalition efforts lead to desirable outcomes in line with the U.S. National Security Strategy (NSS). Subsequently, “going it alone” is rarely an option as it is inconsistent with our NSS: “America will implement its strategies by organizing coalitions—as broad as practicable—of states able and willing to promote a balance of power that favors freedom” (Department of Defense, 2007). The burden of supporting coalition operations does not fall on TRANSCOM alone, yet the transportation related portion does. This means that TRANSCOM is inextricably linked to the success of coalition operations and plays a vital role in the planning and feasibility analysis of these types of operations.

To that end, USTRANSCOM utilizes historic movement data in order to assist in the projection of airlift requirements for future operations. Translated into Time-Phased Force and Deployment Data (TPFDD) for respective Operations Plans (OPLANs), USTRANSCOM is capable of predicting these airlift requirements to facilitate the movement of mission essential passengers and cargo. Further, the TPFDD becomes the basis of TRANSCOM’s periodic Mobility Capabilities and Requirements Study (MCRS)

that is used to support budgetary and procurement decisions about the appropriate amount of Air Force directed airlift assets. As the basis for the projection of future aircraft acquisitions, failure to include coalition airlift requirements in the TPFDD may result in the failure to close TPFDDs as required by GCC's OPLANs and/or the inability to foster multinational participation due to a lack of available airlift. This study looks to identify inaccuracies in coalition airlift projections in order to more accurately portray the relationship between those numbers used for programmatic studies and what may be a different ground truth.

Research Objectives

In order to focus this study within the context of the background just described, the following problem statement was used: If programmatic mobility studies have historically addressed primarily U.S. deployment requirements, does USTRANSCOM systematically underestimate airlift requirements by not considering Coalition airlift demands and if so, by how much? This leads to several questions: (1) what were coalition airlift requirements in terms of number of passengers and tons of cargo as reported by the Coalition Coordination Center (CCC); (2) what were coalition airlift requirements as executed by the TPFDD; and (3) do the processes for determining airlift estimates accurately/completely account for all required aircraft, to include coalition airlift.

Through investigation of USCENTCOM data on cargo and passenger movement as provided by their CCC the goal of this research is to compare actual airlift usage by coalition partners to those coalition movement requirements captured by the TPFDD in order to determine the difference between planned and actual movements. Further, the

research intends to identify whether the delta between the two figures, when incorporated into basic formulas used to project U.S. airlift requirements, would be significant enough to increase the number of aircraft missions.

Assumptions

Assumption 1: The movement data provided by the Coalition Coordination Center represents the complete set of airlift figures for coalition cargo/passenger movements in the USCENTCOM area of operations and can be considered what was actually moved in that theater.

Assumption 2: The data set covering 1 January 2009 through 30 September 2010 can be considered representative of coalition movements across the range of dates for Operations Enduring and Iraqi Freedom. As such, resulting descriptive statistics can be used to make reasonable generalizations about the character of coalition movement during that time period within the USCENTCOM region.

Limitations

Limitation 1: Because TPFDD information becomes classified once it is attached to a specific OPLAN, some portions of the data associated with this research are classified. At the same time, this research will focus on summarizing the general trends and aggregate numbers of the TPFDDs so that overall programmatic conclusions and suggestions can be stated in an unclassified executive summary with supporting classified data points available as required.

Limitation 2: The fast paced, war-time characteristic, coupled by the largely landlocked geography of portions the USCENTCOM area of operations may have created a unique environment with regard to the planning and monitoring of coalition requirements. As a

result, the USCENTCOM approach may be different than other geographic Combatant Commands, thus making generalizability difficult. Nonetheless, depending on the results of this study, other commands may use outcomes to catalyze similar research in other operating regions, particularly because the sum total of untracked coalition airlift worldwide could amplify the delta between projected and actual airlift use. The cumulative effect would make USTRANSCOM data even more inaccurate.

Limitation 3: Coalition building has implications beyond monetary or budgetary constraints. Although the outcome of the research may suggest that GCCs need to do a better job of predicting and tracking coalition movements, those same GCCs may be bound by strong political considerations. This study does not look to assign any kind of value to those political considerations, but suggests that they might be something for decision makers to consider against the recommended outcomes of the research.

Implications

The intent is for USTRANSCOM to utilize the outcomes of this research in order to determine if their current method for formulating its airlift estimates is sufficiently capturing the requirements of all airlift users. In turn, this should result in an adjustment to doctrine/doctrinal application and modeling methods to ensure that coalition airlift use is properly tracked and considered so that procurement, funding and operational planning decisions are based on the entire requirements picture.

II. Literature Review

Chapter Overview

As a whole this review looks to introduce a theoretical framework of coalition operations within the United States Department of Defense (DoD), and explain some of the benefits and challenges of that framework with DoD and non-DoD lenses. The review will then discuss the specific considerations of DoD logistics (supported by USTRANSCOM's air mobility capability) in the context of coalition operations. Subsequently, it will move to describe the basic characteristics of USTRANSCOM logistics and air mobility planning from the strategic perspective, particularly as they pertain to theater specific consideration. This review will culminate with a look at how these strategies have been employed by USCENTCOM in order to meet U.S. and Coalition airlift requirements and war-fighting objectives, in turn. The resulting analysis will uncover a theater specific approach to air mobility planning with specific implications for the forecasting of airlift in support of coalition operations.

Primarily based on DoD Joint and Allied Doctrine, this review provides a thematic outline of the theoretical guidance used to plan contingency support airlift for both U.S. Department of Defense and multinational/coalition entities. It also leverages relevant research articles to supplement these philosophies with practical examples, lessons learned, suggested analytical approaches and current events. For the purposes of this review, all of these publications were organized using the following categories: Introduction to Coalition Operations, Logistics Support of Coalition Operations, Introduction to USTRANSCOM/Strategic Air Mobility and Theater/Coalition Specific Implications.

Introduction to Coalition Operations

Joint Publication 3-16, *Multinational Operations* provides an in depth guide to the structural make up and planning factors of operations involving multiple nations (Department of Defense, 2007). Like the rest of Joint Publications reviewed, it immediately establishes the scope of application of the document. For the purpose of 3-16 (as well as the rest of the Joint Publications), its applicability spans the Armed Forces while participating in any operation involving another country and is intended for use by Commanders as they plan for these operations. It is critical to point out that these Joint Publications are to be used as guidelines but are not binding in a regulatory sense, but that doctrine is commonly used as the basis for stricter regulations or directives.

This initial publication quickly defines a “coalition” in Chapter 1 as: “. . . an ad hoc arrangement between two or more nations for common action” (Department of Defense, 2007). This definition was adopted as the operationalized definition for the duration of the research. Beyond basic definitions, the publication does an excellent job of introducing the fundamental considerations of coalition operations. Among those mentioned is that the depth of knowledge the U.S. has about its potential partners is a prerequisite to determine whether coalition arrangements promote mutual national interests. The document espouses an understanding of a partner’s operational doctrine, equipment possessed and service capabilities as they apply to weapons and materiel resources. The latter is significant in the context of this research as an indication that understanding of service (and particularly logistics) support is essential to reaching mutually beneficial goals. Equally important is that document identifies some general principles of air operations planning for multinational operations, explaining that the

sustainability of air operations is dependent upon airframe availability, maintenance, supply and technical/infrastructure support. The implication is that additional airlift requirements put an added strain on these resource capabilities. Even as the publication suggests that resources should be sourced from across the coalition, that sourcing potential is caveated by a partner's constraints. This is an excellent segue to explore why countries join U.S. coalitions.

Tago's article *Why do states join U.S.-led military coalitions?: The compulsion of the coalition's missions and legitimacy* largely addresses the geopolitical characteristics of coalition formation such as cultural similarities, common languages, relative location and coalition legitimacy (Tago, 2007). While these are definitely of concern when decisions are made whether or not to create a coalition, the article was of limited use in the context of the research. Nonetheless, the article does point out that political motivations can be tempered by a state's ". . . capability to send forces abroad." Just as the weight of the article is found in its discussion of geopolitical considerations, Tago's explanation of a nation's "capability" gives the indication that despite the strongest political motivations, if a nation's armed forces are incapable of getting to the fight, those motivations can quickly become moot. The resulting quandary is whether individual nations will provide their own transportation and logistics or if that burden will fall on the U.S.

DoD Logistics & Logistics Support of Coalition Operations

In making a case regarding the nature of coalition logistics vis-a-vis success in the wars in Afghanistan and Iraq, Martin contends that successful coalition logistics is prerequisite. His *Coalition Logistics: The Way to Win the Peace, The Way to Win the War*, introduces the idea that integrated and partnered logistics lessens the resource

burden from the U.S.: “. . . international resources allow the nation to maintain international involvement in a constrained environment with limited personnel and resources while bolstering cooperation with friends and allies” (Martin, 2007). This quote underscores the overarching case for coalition operations. The article goes further in attributing the benefits of those operations specifically to logistics support at the same time that it identifies coalition logistics as an explicit tool of foreign policy that is critical to international relations. The author’s contentions are supported through an historic analysis of the role of coalition logistics across the major U.S. military engagements of the 20th Century using a case study approach that ties coalition logistics to National Security Strategy objectives. Although the specifics of the analysis are largely superfluous, they make a convincing case as to the historic and continuing role of logistics, concluding that logistics planning needs to be more thoroughly integrated in larger campaign and foreign policy planning. As a related aside, Martin points out that the as the primary source document for the logistics supportability of joint operations (Joint Publication 4-0) offers no definition of “coalition logistics”. While one may be able to surmise that definition from a variety of other Joint Publications and doctrine, the point is noteworthy in that it identifies a critical omission in the seminal publication for DoD logistics doctrine and reflects the lack of attention to the topic in Joint Doctrine.

Even though Joint Publication 4-0 does not have a great deal of detail regarding the planning or execution of coalition operations, it has many philosophies that are universal in their application to planning of all types. Among other topics, the publication espouses the core capabilities of logistics that are intended to support integrated decision-making for Joint operations (Department of Defense, 2008). One of these competencies,

deployment and distribution, is named “the cornerstone of joint logistics” as it supports the movement of forces and equipment in and out of theater. As a related planning consideration, JP 4-0 explains that movement, in and of itself, is not enough to meet command goals, but that delivery must adhere to strict timing requirements as identified in operations plans. At this point, USTRANSCOM is introduced as the supporting command responsible for ensuring time definite delivery. As part of an integrated planning process, Geographic Combatant Commanders must identify critical movement composition and timing requirements to USTRANSCOM in order to determine transportation feasibility of their plans. As explained in Joint Publication 4-0, the resulting time based sequencing of forces is the TPFDD. The underlying suggestion is that if deployment planning is not thorough and inclusive of all requirements, the GCCs entire Operations Plan (OPLAN) could be compromised. Although Martin may contend that the publication is not explicit in its applicability to coalition logistics, their implicit value is undeniable as a basis for multinational logistics doctrine. Further, there is a small section in the publication that addresses multinational logistics, going as far as to categorize them as a “challenge”. To expound, the challenge is characterized by its apparent lack of understanding of capabilities, procedures and interoperability. Despite these challenges, the publication indicates that the degree of operational flexibility available to a combatant commander is partially indicative of their ability to leverage coalition logistics. At the end of this section, there is a reference to more detailed doctrinal guidance in JP 4-08, Joint Doctrine for Logistics Support of Multinational Operations.

JP 4-08 is more specific in its handling of coalition logistics planning. Its most significant contribution to this review can be found in its ability to tie the joint philosophies of JP 4-0 to multinational operations. Of interest, however, is the naming of USTRANSCOM as the DPO who is responsible for providing strategic movement to multinational partners, to include the provision of planning resources to that end (Department of Defense, 2002). Rather than rehash previously discussed planning considerations, it is sufficient to suggest that any of the doctrinal guidance found in JP 4-0 is applicable to coalition logistics. Still, there are some unique considerations that, although they do not negate JP 4-0's philosophies, may serve to complicate their execution. The publication indicates that "Because of its logistics strengths, the United States may be requested to provide a range of common logistics support to some or all participating nations" (Department of Defense, 2002). Coupled with a quote from later in the publication, there is a foreboding that resource competition can become a threat to coalition relationships or mission outcomes: "Most planning for multinational operations, therefore, tends to be ad hoc . . . planning for multinational operations usually commences only after the crisis has developed" (Department of Defense, 2002). If JP 4-0 advocates integrated logistics planning as critical to mission success and JP 4-08 suggests that common-use resources are likely subject to delayed and/or incomplete planning, the net result could be a negative mission impact. The challenge that emerges is how U.S. planners can adequately project coalition involvement to avoid jeopardizing transportation feasibility. This sentiment is implied (many times in obvious ways) throughout the document.

Despite the planning concerns discussed in 4-08, the same publication suggests a series of structural and organizational characteristics that can help to mitigate logistics challenges during execution. First and foremost, the document discusses the commonly used structure of organizing all air assets under a single Joint Force Air Component Commander (JFACC). While the JFACC might be a widely known and understood position, the assignment of a director of mobility forces (DIRMOBFOR) is not as universally understood. The DIRMOBFOR is typically assigned under the JFACC as the party responsible for the coordination of inter- and intratheater air mobility operations, to include multinational aircraft. One of the key organizations that the DIRMOBFOR may employ to orchestrate air movements is a Joint Movement Center (JMC) that is responsible for coordinating U.S./coalition movements into and out of the area of operations. In order to capitalize on information synergies, both the DIRMOBFOR and the JMC are usually collocated at the Combined Air Operations Center for the theater (Department of Defense, 2002). Among the informational requirements of the JMC are timely deployment information as it applies to coalition movements in order to integrate these moves into a comprehensive TPFDD (discussed in detail later).

The underlying, common theme of coordination and the importance of structures that support interoperability between nations transcends U.S. doctrine and is seen in NATO and Allied doctrine publications as well. While this continuation of themes is not surprising given that multinational doctrine is derived from U.S. doctrine, it is significant in that it literally translates the fundamentals of U.S. approaches, thus facilitating access to a broader range of nations. As the overarching doctrinal guidance for support of NATO operations, the NATO Logistics Handbook is an introduction to “. . . the basic

principles, policies, concepts and organisations (sic) with which they will work” (North Atlantic Treaty Organization, 2007). Chapter 9 specifically addresses movement and transportation. While the ever-present doctrinal philosophies concerning coordination/cooperation vice competition can be found here as well, there is also a clear indication that nations are expected to provide their own movement: “Nations are responsible to provide transportation resources to move their own forces and material” (North Atlantic Treaty Organization, 2007). Even if this quote appears intuitive, it can be interpreted as an indication that transportation capability can be a limiting factor to coalition participation. Consequently, although the “support your own movement” concept may be ideal, if the U.S. wants multinational participation, they must be willing and able to supplement the transportation capabilities of other nations. Much like the organizational structures proposed by JP 4-08, the NATO handbook introduces the Allied Movement Co-ordination Centre (AMCC) as a method to integrate all coalition movement priorities. It acts as an informational conduit between NATO partners and other centers of operational and logistical planning such as the CAOC or JMC.

The logistics series of Allied Joint Doctrine are a similar restatement of United States DoD logistics doctrine as explained in Joint Publications. From that perspective, their value is less for the practical application of concepts by U.S. planners than it is for the structure they provide to the library of multinational logistics doctrine that facilitates transnational exposure (see Figure 1). *Allied Joint Logistics Doctrine* (AJP-4) (North Atlantic Treaty Organization, 2003), *Allied Joint Movement and Transportation Doctrine* (AJP-4.4) (North Atlantic Treaty Organization, 2005), *Multinational Joint Logistic Centre Doctrine* (AJP-4.6) (North Atlantic Treaty Organization, 2000) and *Air Forces*

Logistic Doctrine and Procedures (ALP-4.3) (North Atlantic Treaty Organization, 2002)

expand on the basic structural and conceptual fundamentals of the NATO Logistics

Handbook, using a distinctly U.S. model.

Some of those same fundamental concepts can be seen in Ghanmi, Campbell and Gibbons piece *Modeling and Simulation of Multinational Intra-theatre Logistics Distribution* (Ghanmi, Campbell, & Gibbons, 2008). This article speaks to different ways of improving multi-national logistics distribution in a theatre of operations. At the heart of their analysis is the efficient movement of items within a theatre, yet they highlight the importance of maintaining visibility of the end-to-end distribution system specifically as it relates to cost and time definite delivery. They go on to advocate the need to communicate requirements across coalitions in order to avoid stovepipes and cost inflations while pushing for on-time deliveries.

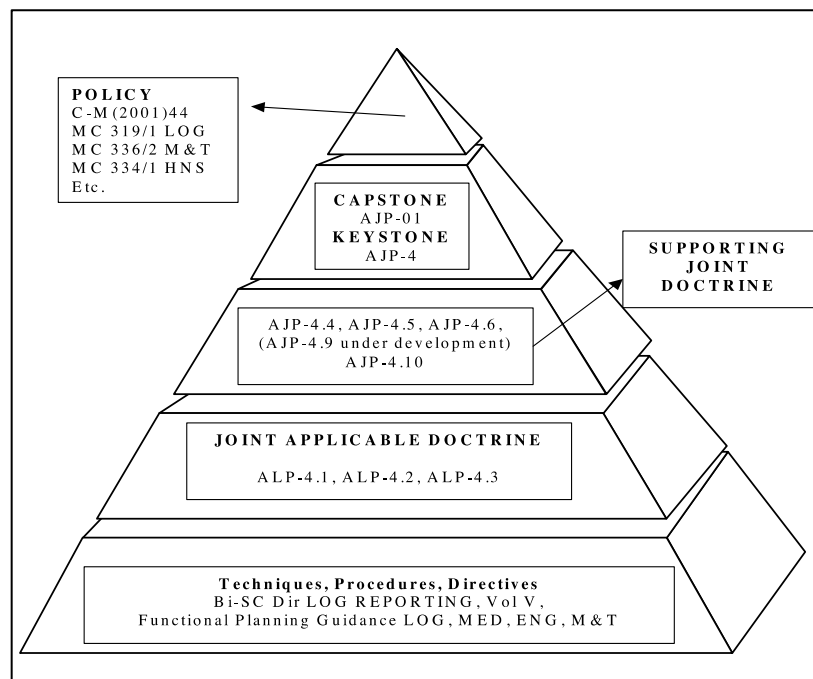


Figure 1: Allied Logistics Publications (North Atlantic Treaty Organization, 2003)

Ghanmi, Campbell and Gibbons are not the only authors to address the challenges of coalition operations. Matthews and Holt's discussion of Desert Shield/Desert Storm *So Many, So Much, So Far, So Fast* is a lengthy analysis of strategic mobility in that conflict. In it, the authors address the fact that the burden of airlift fell primarily on the U.S. with respect to those countries that supported the operation (Matthews & Holt, 2002). The article also explains the challenges associated with mission planning within the realm of Aeromedical Evacuation. At the root of the problems was what was perceived as a lack of participation by coalition members in the refinement of the TPFDD. This is significant, as it is an indication of the potential problems that can arise when coalition movements are not properly TPFDD. Further, it is important evidence of this occurring within the CENTCOM area of operations. At the same time, "Although foreign flag carriers completed a relatively small number of the total commercial missions flown in support of the operation, the U.S. government considered their effort to be symbolically important" (Matthews & Holt, 2002).

These same types of observations are not lost on Celestine A. Ntuen in her technical report *Logistics Planning for Coalition Command and Control* (Ntuen, 2005). In the paper, the author looks at logistics command and control structures in order to advocate the use of modeling and decision support systems to ease coalition logistics planning. Even though the resulting analysis is focused more on the actual technical characteristics of a specific modeling tool and its algorithms, she also makes some more general and relevant observations of potential challenges in line with Matthews and Holt, like the lack of coalition access to information/information systems, the stove piped development of

transportation models/simulations and the limited use of advanced planning/scheduling technologies. Who, then, is responsible for addressing these transportation and logistics challenges?

Introduction to USTRANSCOM and Strategic Air Mobility

The most important question for the Department of Defense when it comes to strategic air mobility is that of who has the statutory responsibility for providing air mobility and what that responsibility entails. The short answer to those questions can be found in DoD Directive 5158.04, *United States Transportation Command* (Department of Defense, 2007) and DoD Instruction 5158.06, *Distribution Process Owner* (Department of Defense, 2007). On the most basic level, 5158.04 designates TRANSCOM as the “Mobility Joint Force Provider”. Along with this responsibility comes the Title X responsibility as the “DoD Distribution Process Owner” (DPO). According to the publication, the inherent duties of those designations as they pertain to this research include: Combatant Command of Military Surface Deployment and Distribution Command, Military Sealift Command and Air Mobility Command in order to provide air, land and sea transportation to the DoD; provision of common user terminal management (for all modes); readiness and capability monitoring of global mobility assets; and advisement of the Joint Chiefs of Staff as to the capacity, sourcing, characteristics and make-up of mobility assets/forces to execute the TRANSCOM mission. Similar themes and responsibilities are included in DODI 5158.06. This document more clearly defines distribution as seen in the previous publication as inclusive of force projection, sustainment and redeployment/retrograde operations. Of equal importance is 5158.06’s introduction of the Joint Deployment and Distribution Enterprise (JDDE) concept: “The complex of equipment, procedures,

doctrine, leaders, technical connectivity, information, shared knowledge, organizations, facilities, training, and materiel necessary to conduct joint distribution operations . . .” (Department of Defense, 2007). The JDDE includes the entire force deployment boundary from point of origin to point of consumption. As a critical JDDE partner, USTRANSCOM (as the DPO) is responsible for providing the JDDE with process improvement expertise for specific implementation of transportation plans that transcends service in order to ensure effective and efficient distribution processes. These responsibilities become particularly important when looking at the subsequent structures, both internal to USTRANCOM and within a Geographic Combatant Command, intended to align distribution processes and provide data visibility across the JDDE. Along with campaign planning, TRANSCOM is charged with: oversight of process improvement studies and analysis; distribution training/doctrine; allocation/validation of deployment priorities for Joint Force Commanders, to include adjudication of constraints. Most importantly is the requirement for TRANSCOM to “Advocate for the JDDE in all phases of the DoD planning, programming, budgeting, and execution process to ensure the JDDE attains the best mix of capabilities . . .” (Department of Defense, 2007). The manifestation of this statement is TRANSCOM’s *Mobility Capabilities and Requirements Study* (MCRS, discussed below). Finally, the publication discusses the DPO structure of governance responsible for ensuring compliance with the requirements described above. The governance structure is supposed to include key JDDE partners such as members of the Joint Staff, representation from the Office of the Secretary of Defense and Combatant Commands, to name a few. Absent from the roster is any kind of international representation, just as there is no mention of supportability of

multinational operations as one of the responsibilities of the DPO. The reader is left to assume that advocating for the analysis of multinational operations and/or their JDDE effects is left to the respective GCC.

As a statement of its strategy towards meeting the goals and/or requirements levied upon the organization by the DoD, USTRANSCOM issued its *Strategic Plan 2009* (United States Transportation Command, 2009). As the most current strategy document reiterates its missions as explained in 5158.04 and 5158.06 as the Mobility Joint Force Provider and the DPO. In the context of this research, its description of Air Mobility Command as the primary provider of airlift and air mobility support pinpoints who is responsible for the tactical execution of these missions, including those involving coalition partners. It also describes TRANSCOM's interpretation of JDDE partners very much in line with the statutory guidance. It suggests a standardization of the Joint Deployment Distribution Operations Centers as a JMC-type means to increase visibility and improve JDDE coordination, while reducing the seams within the JDDE. Like the statutory guidance, however, it fails to identify international partners as a collaborator in the same subsection that advocates the requirement to "use an end-to-end view of DoD's global supply chain to optimize and integrate the individual efforts and process of JDDE partners" (United States Transportation Command, 2009). Further, it espouses that "DoD can no longer afford separate stove-pipes within the JDDE, each performing according to their own measures of success . . . USTRANSCOM must . . . reduce the barriers that keep us from working as one team" (United States Transportation Command, 2009). The lack of mention of multinational operations specifically may reflect the underestimation of the impact of coalition requirements on the JDDE and transportation planning. To that end,

the strategic plan identifies many of the critical metrics by which its performance as the DPO can be judged. Included in this list are metrics that reflect the ability of TRANSCOM to meet delivery dates as published in the relevant TPFDD. As the late introduction of coalition airlift requirements to the TPFDD (or more importantly the exclusion of them from the TPFDD) has the potential to negatively affect on time delivery metrics, it may be important to consider these moves in strategic planning.

Joint Publication 3-17, *Air Mobility Operations* establishes the importance of airlift (as a component of logistics) to supporting National Military Strategy and National Security Strategy (through TRANSCOM as the DPO) around the globe and ascribes some of airlift's critical processes. As the document explains, airlift is the "cornerstone of global force projection" because of its unmatched capability to rapidly transport cargo and personnel worldwide (Department of Defense, 2009). From a procedural perspective, the publication discusses the Combatant Commander's process of creating and prioritizing movement requirements (stemming from OPLANs) in the form of a TPFDD that are pushed to USTRANSCOM to determine movement feasibility. Of particular significance is the fact that the publication notes the TPFDD as the primary means for the Combatant Commander to identify movement requirements to USTRANSCOM. As part of determining feasibility of air transportation, USTRANSCOM assesses not just aircraft availability but also its ability to provide origin, en route and destination support to its inter theater airlift assets. This support includes, but is not limited to, command and control, aerial port and aircraft maintenance. One of the primary goals of this support is to provide near real time in-transit visibility (ITV) of aircraft and their cargos in order to account for the arrival of passengers or cargo and facilitate timely closure of TPFDD line

items that meet war-fighting objectives. This establishes ITV as a major consideration for TPFDD accuracy. Using computer systems such as the Single Mobility System (SMS), the Global Transportation Network (GTN), the Global Decision Support System (GDSS) and the Global Air Terminal Execution System (GATES), USTRANSCOM can maintain visibility of DTS airlift to make TPFDD adjustments to meet Combatant Commander objectives. These foundational principles of airlift, while grossly simplified, are essential not only for the day to day execution of the system itself, but are the cyclical inputs for future planning that ensure appropriate decisions regarding DTS capacity. Of note in this publication is the lack of substantial material on multinational planning considerations. While the topic is included, it is relegated to one paragraph in 100-plus page document. Much like previous documents, the paragraph does highlight the need for “highly trained liaison staffs to ensure integration, coordination and synchronization of air operations”, a subjective call for “experts” that may indicate one of the underlying (and likely politically sensitive) causes of non-standard coalition planning (Department of Defense, 2009).

If the preceding examples set the standard for overall responsibilities and system inputs both doctrinally and practically, what do those inputs translate to in terms of long-term programmatic outputs? In *The Algebra of Airlift*, the authors provide an in-depth look at the mathematical programmatic factors that contribute to the formulation of strategic airlift requirements used in the MCRS (Brigantic & Merrill, 2004). Just as the heavy mathematical context of this article limits its utility in relating to the overall topic of research, its implications with regard to the critical nature of thorough transportation planning is striking. It highlights the importance of cargo and passenger numbers to

accurate modeling by identifying the fundamental equations of airlift planning as supported by Air Force Pamphlet 10-1403, *Air Mobility Planning Factors*:

$$\begin{aligned} \text{number of cargo missions} &= \frac{\text{cargo requirement}}{\text{average payload}} \\ &\text{- and -} \\ \text{number of PAX missions} &= \frac{\text{PAX requirement} - \text{PAX on cargo missions}}{\text{PAX capability per PAX mission}} \end{aligned}$$

Figure 2: Basic Airlift Calculation Equations (Department of the Air Force, 2003)

These equations also provide the entry point for the quantitative outcomes of the part of this research. In other words, entering coalition cargo and passenger data into these equations will be the initial step in comparing the programmatic data USTRANSCOM is currently using to a different data set that includes a more accurate account of coalition airlift requirements. The ability to complete the airlift data picture answers the authors' call that the precision of the models that use this data is the underpinning of billions of dollars in procurement and transportation decisions.

USTRANSCOM's main tool for communicating its transportation and mobility requirements in support of the National Military Strategy is the periodic *Mobility Capabilities and Requirements Study* (MCRS) (United States Transportation Command, 2010). In particular, the *MCRS-2016* focuses on how the on-time delivery of forces (as determined by the TPFDD) affects the ability to meet war-fighting objectives and how airlift force shape and size is related to timely delivery. Using calculations such as those

above, the document explains that accurate mobility modeling is crucial to projecting airlift requirements and in turn projecting congressional budget requests to support that airlift. These models are based primarily upon historic airlift use data that is used to create “worst case scenarios” that drive force-shaping decisions. Although accurate data is crucial, there is no mention in the executive summary of the document of coalition partners as a planning factor. Underlying the explicit cost of procuring more aircraft is the cost of operating those aircraft, not just in terms of flying the aircraft itself, but the deployment of the global support network to move the aircraft from one theatre to another. As such, the recommendations of the MCRS must be based on thorough and complete information in order to ensure the airlift fleet is capable of meeting global contingency requirements.

As an independent contractor hired to validate, verify and accredit the MCRS, The Institute for Defense Analyses issued a supporting Accreditation Report, affirming the methodology of the study and its modeling. While generally less than noteworthy, the Accreditation Report did highlight that its endorsement of the models and simulations of the MCRS are based on the “to available” (Jackson, 2009). According to TRANSCOM research topic proposal, however, the “best data available” does not necessarily include accurate coalition airlift data, potentially compromising the foundational models. The same organization was contracted by the DoD to complete the *Study on Size and Mix of Airlift Force* following the completion of the 2005 Mobility Capabilities Study (MCS) with the goal of determining if the projections made by the 2005 MCS were meeting fleet requirements across the range of military operations. As the predecessor to the MCRS of 2016, the MCS used similar modeling techniques and like the MCRS was based on

TPFDD information. This report found that TRANSCOM had made the correct decisions on the size and mix of the airlift force. Once again though, planning factors such as size of military and civil fleet; use scenarios such as major theatre wars, humanitarian assistance, etc.; and cargo/passenger projections failed to include coalition participation (Greer, Koretsky, & Woolsey, 2010).

Despite the potentially incomplete coalition data used to validate these requirements studies, the authors contend that their validation reports are indicative of the adequacy of the requirements studies' airlift projections for operational supportability. Lieutenant Colonel James W. Herron's research *Future Airlift Requirements* would argue otherwise. Using the same data from the 2005 MCS, Lt Col Herron suggests that the per day tonnage requirements of that study are flawed in that spikes of nearly 20% per day reflect what the Air Mobility Command Commander described as "likely to continue if not increase in the future" (Herron, 2005). Herron's research is not intended to analyze the cause of the increased requirements, but contends that continuing to underestimate airlift requirements into the future could have a negative effect on the U.S. Army's ability to meet force closure targets in the face of contingencies. Although not specifically attributable to coalition requirements, his exposure of a delta between projected and actual requirements validates this research in that it is an affirmation that there is currently an unaccounted for shortage in airlift with the potential to threaten overall OPLAN goals.

Theater and Coalition Specific Implications

As its DPO primer to the Geographic Combatant Commands, USTRANSCOM Handbook 24-2, *Understanding the Defense Transportation System* provides the GCCs

with guidance on how these JDDE partners can work with TRANSCOM in order to meet their contingency mobility/airlift requirements and satisfy TRANSCOM's role as the DPO (United States Transportation Command, 2009). In general terms, the handbook is an introduction to the TRANSCOM, explaining its mission, customers, capabilities and resources. (Of significance, it describes the DTS customer base without mention of coalition forces). While highlighting its goals, providing customer ITV stands out as the goal with a specific tie to the metrics mentioned in their Strategic Plan. To that end, it advocates the development and integration of new technologies, capabilities and weapons systems. As 24-2 explains, the main weapons system that TRANSCOM proposes to meet these objectives is the Deployment Distribution Operations Center (DDOC). The goal of establishing the DDOC within each GCC is “. . . to synchronize and optimize strategic and operational multimodal resources to improve distribution, force deployment, and sustainment within its area of responsibility” (United States Transportation Command, 2009). The concept is for TRANSCOM experts to imbed with theater planners in order to optimize use of the DTS, simultaneously facilitating the timely closure of the GCC's TPFDD.

For a better understanding of the doctrinal structure and makeup of a CDDOC, the *Joint Deployment Distribution Operations Center Template* is a good reference. (see Figure 3). Intended for use across the geographic Combatant Commands, this document describes the organization's raison d'être as: “. . . a joint capability solution designed to satisfy the requirement to integrate strategic and theater deployment execution and distribution operations within each geographic Combatant Commander's Area of Responsibility” (United States Transportation Command, 2008). In a more practical

sense, it charges the JDDOC with providing the type of ITV that is critical to TPFDD oversight. This is reinforced by the suggested battle rhythm that includes (among other actions) daily scrutiny of the Joint Operation Planning and Execution System (JOPES) to monitor TPFDDs and frequent interactions with USTRANSCOM. From an organizational perspective, the template describes a structure equipped to deal with many of the multinational operations challenges discussed in the first section of this review including doctrinal standardization, command and control and logistics preplanning.

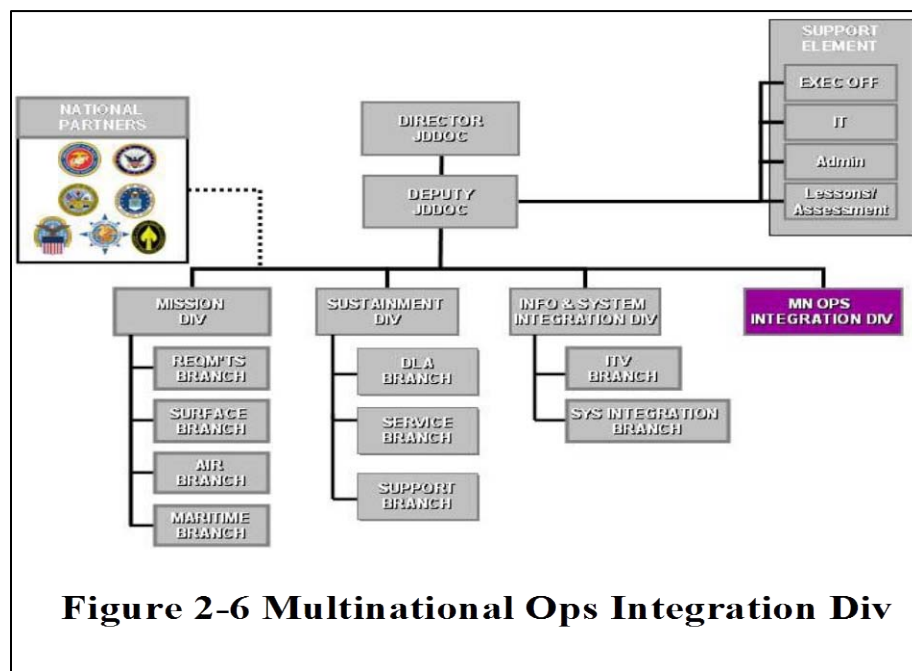


Figure 3: DDOC Organization Structure (United States Transportation Command, 2008)

Although the establishment of a multinational Ops Integration Division is not mandated, DDOC planners are encouraged to “. . . invite collaboration and/or collocation of . . . liaisons to coordinate and synchronize lift requirements and execution of common user modes of transportation . . .” (United States Transportation Command, 2008) More

specifically in terms of responsibilities, the division is charged to: “Collect coalition requirements and submit to the supported command validator . . . to build the unit line number in JOPES” and “Analyze JOPES for errors on ULNs and add new requirements to the Coalition Movement Schedule” (United States Transportation Command, 2008). These suggestions indicate the desire for coalition movements to be included in the TPFDD while demonstrating TRANSCOM’s understanding of the potential for coalition movements to impact GCC transportation. Nonetheless, they remain suggestions that could be construed as ambiguous and non-binding in the template’s failure to describe to the impact of poor coalition ITV on the GCC’s movements.

United States Central Command has taken an approach generally in line with the doctrinal foundations established above that is equipped to interact with USTRANSCOM and coalition members alike. Its established Combined Air Operations Center at Al Udeid Air Base is the focal point for theater air operations to include housing the DIRMBOFOR/Air Mobility Division and JMC. As Lieutenant Colonel Gregory S. Otey (USAF) explains, however, the Secretary of Defense’s 2003 identification of TRANSCOM as the DPO from “factory to foxhole” pushed the functional command to take an active role in “mending the seam between strategic and operational logistics” (Otey, 2006). The result was the TRANSCOM and CENTCOM joint venture that would become known as the CENTCOM Deployment and Distribution Center (CDDOC), headquartered at Camp Arifjan, Kuwait. Otey does an excellent job of describing the structural highlights of the CDDOC as well as discussing some of its successes and challenges in his article “Mending a Seam: Joint Theater Logistics”. In relation to the planning and oversight of coalition air movements however, the piece offers little in

terms of overt analysis. Nonetheless, there are lessons learned within the article that can apply to coalition movements as easily as they do to those of the U.S.. For example, Otey quotes Lieutenant General Claude V Christianson to describe some of the challenges faced in bringing services together: “When the Army, Navy, Air Force, and Marines work side-by-side . . . the combined supply system is a clashing mismatch of different cultures, incompatible communications systems, different stock numbers for similar items, even different vocabularies” (Otey, 2006). If this is the case for homogeneous U.S. interoperability, the same challenges can be assumed to multiply in the multinational context. Another omission to mention comes with the scrutiny of the “roster” which Otey uses to describe CDDOC makeup. Among those included such as the Defense Logistics Agency, Joint Munitions Command and individual service representation. Conspicuously absent is any representation of multinational or coalition members.

In order to strengthen the planning relationship between the U.S. and its coalition partners, CENTCOM has also established its Coalition Coordination Center (CCC) in order to “. . . support the strategic objectives of the commander by coordinating the identification, development, and movement of coalition resources necessary to satisfy force capability requirements within the command’s AOR” (Couture, 2008). Surprisingly little exists to describe the origin or makeup of the CCC from a strictly doctrinal perspective. Couture’s document *Integration of Coalition Forces into the USCENTCOM Mission* helps to fill the doctrinal void from an informational perspective if not a regulatory one. Couture describes the post Desert Shield and Desert Storm conditions that led CENTCOM planners to establish the CCC immediately following

9/11 as lacking the ability to support and integrate coalition members in the planning process. He also discusses some of the political reasons for establish a CCC: “. . . programs for supporting our coalition partners and building partner military capacity enable coalition partners to participate in U.S. operations and conduct counterterrorist operations when they otherwise lack the financial means to do so. Their participation reduces the stress on U.S. forces . . .” (Couture, 2008). This philosophy is a common thread throughout the article, particularly in the conclusion. Nevertheless, it is important to note that as consistent as this philosophy is with doctrinal recommendations, the CCC’s organizational chart (Figure 4) reveals that the center does not focus solely on logistics issues, but takes an approach that includes virtually all aspects of military planning and operations. Still, according to logistics planners in the CCC Logistics (C4) directorate, they frequently work with the CDDOC as a way to leverage its relationship with USTRANSCOM in order to request U.S. airlift.

More directly, the document dedicates a section to air operations planning. The publication puts an emphasis on the coalition member’s ability to provide trained liaison staffs to the coordination process. Most importantly, the publication suggests that in the absence of multinational guidance for airlift planning, “multinational air operations should resemble those for joint air operations” (Couture, 2008). Although there are no notable departures (doctrinally speaking) from the previous reference that would make this publication significantly relevant to the topic at hand, it is very significant in that it inserts the concepts of joint air operations introduced in Joint Publication 3-17 into the context of a multinational operation. This is an indication that the expectations for coalition planning, tracking and oversight are expected to be similar, if not identical, to

stand-alone U.S. operations. Furthermore, both documents establish a standard by which we can evaluate the United States Central Command business model in order to determine how it accounts for and reports its coalition airlift requirements.

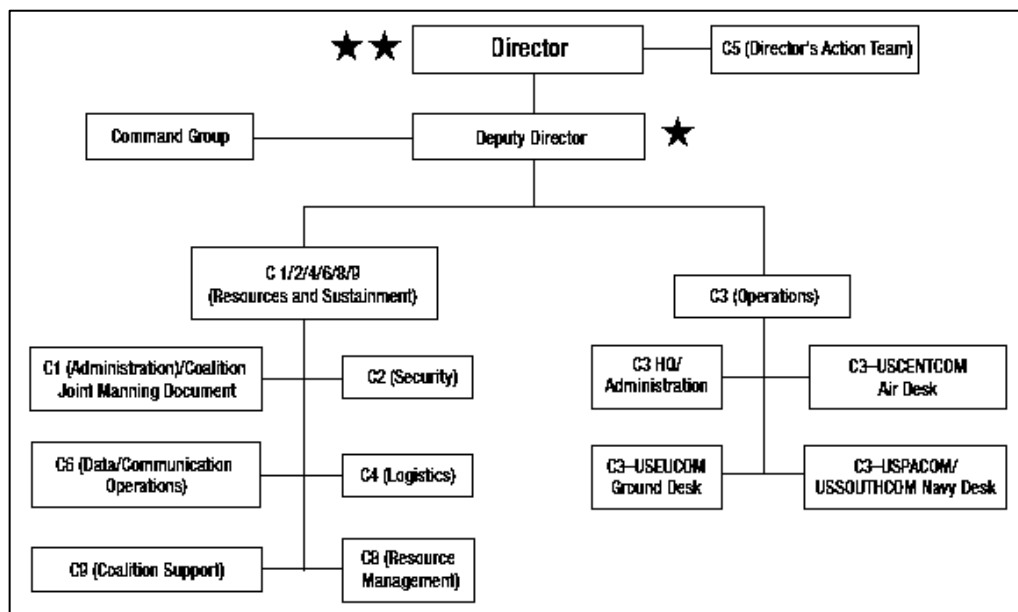


Figure 4: Coalition Coordination Cell Structure (Couture, 2008)

Summary

In sum, these references described the general nature of multinational/coalition operations and discussed some of the associated benefits such as broad support of contingency objectives. Additionally, they introduced some of the challenges like information sharing, communications and structuring. The preceding literature explained the need for multinational logistics to support coalition operations while proposing an array of supporting capabilities like airlift/air mobility. These documents go on to introduce USTRANSCOM as the owner of those capabilities and propose both TRANSCOM and theater organizational structures, processes and systems intended to

support transportation at large, airlift specifically and coalition mobility in particular.

Despite the doctrine, lessons learned, modeling approaches, etc. discussed in this review, USTRANSCOM representatives still contend that there is a difference between what the TPFDD reflects in terms of coalition movements and what is actually being moved on board U.S. aircraft. This sentiment was echoed by the CCC, who's representative confirmed that all coalition moves were not included in the TPFDD.

III. Methodology

Chapter Overview

The intent of this chapter is to describe the methodology used for this research. From a very basic perspective, the foundational concept behind this study was to make a comparison of the foundational data used to determine USTRANSCOM airlift requirements (namely the TPFDD) to airlift movement data as provided by the coalition coordination cell at USCENTCOM. While the research approach itself does not require rigorous quantitative analysis or extensive modeling, it is unique in its novel contrast of disparate data sources derived from the data tracking strategies of two separate combatant commands. As such, the rigor of the research is defined less by the particular methodology and more by its ability to make a simple comparative link between those previously unconnected data sets. Ultimately, the comparison will be used to (in)validate a hypothesis and address three research questions that relate directly to USTRANSCOM's ability to thoroughly and accurately account for airlift movements in accordance with the problem statement.

Determination of Methodology

The research approach was based primarily on initial scoping discourse conducted with the research sponsor at USTRANSCOM and a subsequent point of contact at the CENTCOM Coalition Coordination Cell. Specifically, the CCC representative explained that some coalition movements were included in the TPFDD and others were not, however those that were included could be identified by the first digit of their unit line number, "U". The representative also indicated that the organization maintained a "home grown" running spreadsheet of all coalition moves. This corresponded with responses

from the TRANSCOM rep that confirmed that not all coalition movements were maintained in the TPFDD, meaning that they were unaware of the size of coalition airlift requirements.

Based on these responses, it was determined the most effective analysis would be derived from an ex-post facto investigation of USCENCOM data on multinational cargo and passenger movement as provided by their Coalition Coordination Center with the ultimate goal of comparing the CCC usage data to those coalition movements documented in the TPFDD. Such a comparison was used to determine the difference between the two data sources in order to identify the true size of unprogrammed or unplanned coalition cargo and passengers moves. Further, the research was intended to identify whether the delta between the two figures, when incorporated into programmatic formulas used to calculate airlift estimates, would be significant enough to effect airframe acquisition decisions and/or trigger deployment of additional U.S. mobility forces or assets.

Data Collection Methods

The baseline data for this research was the Time Phased Force and Deployment Data as it is currently the primary source for future planning and programming decisions by USTRANSCOM (as explained in chapter 2). Headquarters United States Air Force, Plans and Analysis Division, compiled this portion of data as a query from the Air Force's TPFDD portal, the Deliberate Crisis Action Planning and Execution Segments (DCAPES) system. By accessing this TPFDD repository, the DCAPES technician created a focused data pull to include line items that met following criteria: (1) those moved via an air mode of transportation; (2) those moved in and out of the CENTCOM

area of operations; (3) those movements stored in the DCAPES repository. Along with the preceding data points, the resulting pull also included information such as aerial port of embarkation/debarkation, date of movement, unit line number, unit origin, cargo tonnage and passenger totals. Because of the limited historical database supported by DCAPES, the data from that system covered only calendar years 2009 through 2011.

The comparison data was comprised of similar information specific to coalition movements in the CENTCOM region. As the primary link between coalition partners (via direct discourse or through embassies) and airlift planners in the CDDOC (and subsequently USTRANSCOM), the CCC was able to provide comprehensive data regarding coalition passenger and cargo movements in to, out of and around the CENTCOM area of operations. This comprehensive spreadsheet included 930 lines of data, each one representative of an individual coalition move. Each line provided information on country of origin for cargo/passengers, load composition in cargo tons/number of passengers, aerial port of embarkation, aerial port of debarkation, requested date of movement, unit line number (when available) and actual date of movement. This data ran from calendar year 2005 through the end of 2009.

Data Analysis Methods and Hypothesis Development

The first step of the data analysis was to determine a feasible range of dates for evaluation of the two data elements. Although the CCC data went as far back as 2005, the historical limitations of DCAPES meant that the earliest viable data came from the start of 2009. As DCAPES is a “real time” system, the latest data available came from the actual date of the data pull. Regardless, the CCC data only reflected moves through

the end of September 2010. As a result, the range of data comparison became 1 January 2009 through 30 September 2010.

Once the dates were aligned, the TPFDD was searched for unit line numbers for coalition movements. Those TPFDD line items with a ULN starting with “U” were isolated in order to eliminate any moves not involving coalition members. Using a month by month approach, the remaining TPFDD moves were then evaluated against CCC moves and matched based on origin unit, aerial port of origin/destination, movement date and cargo/passenger load composition. If unit designation, either APOD or APOE, approximate move date and approximate load composition were the same in both data sources, the move was considered accounted for. Any moves in the CCC data source that could not be matched to TPFDD moves using that criteria were considered unaccounted for by USTRANSCOM. The load composition totals for these unmatched moves were then aggregated to provide a total unaccounted for movement requirement for the given year. This portion of the research would test the following hypotheses:

HO: There is no difference between the quantities of cargo and passengers on TPFDD planned movements and those quantities reflected by the CCC.

HA: The quantity of cargo and passengers on TPFDD planned movements is *less than* those quantities actually moved by U.S. airlift.

By plugging the unaccounted for airlift requirements into the equations of figure 2 (from Chapter 2) and using the planning factors from AFPAM 10-403 summarized in table 1 below, the subsequent results would identify the airframe equivalent totals associated with those requirements. If (as TRANSCOM suggests) historical analysis of

the TPFDD is the basis of the MCRS and a significant number of coalition movements are not being accounted for on the TPFDD, there is a good chance that current fleet and/or budget projections may be inaccurate. Although not the primary focus of this research, a variety of descriptive statistics were subsequently produced to indicate monthly averages, month-to-month variation and possible trends, all of which could be used by TRANSCOM to catalyze a more in depth assessment of the effects of timing or seasons on coalition airlift demand.

Table 1: Airlift Planning Factors

	C-17	C-130	C-5
<i>Passengers Per Mission</i>	90	80	51
<i>Cargo Short Tons Per Mission</i>	45	12	61.3
<i>No. of Pax on Cargo Mission</i>	11	0	51

Based on the quantitative outcome of the test, the second part of the research involves an analysis of current planning structures and organizations as explained in DoD and USTRANSCOM guidance against the current model used in CENTCOM as explained by their Coalition Coordination Center. This should explain the potentially unaccounted for airlift requirement of moving coalition partners. These outcomes will be juxtaposed with the quantitative outcome of inclusive models in order to be presented to USTRANSCOM for them to determine whether a stricter enforcement of doctrinal policies could lead to a greater degree of fidelity for airlift capability requirements data and if the accuracy of the data outweighs associated coalition building/political concerns. The following are the related research questions: (1) If coalition airlift usage data is not collected in the same

manner as the U.S. requirements is there a loss in data integrity used for airlift planning?

(2) Are current programmatic studies for determining airlift estimates accurately capturing coalition airlift requirements? (3) Is USTRANSCOM accurately projecting mobility requirements/budgets to include coalition requirements?

Chapter Summary

This chapter explained the analytical framework of this research leading to the establishment of the hypothesis and associated research questions. This methodology was intended to test that hypothesis and answer research questions in order to establish a link between the distinct data sets of USTRANSCOM and USCENTCOM. Throughout this methodology and the following analysis, results will maintain an anchor to the problem statement described in chapter 1.

IV. Results & Analysis

Chapter Overview

This chapter discusses the analysis of data collected through the course of this research in accordance with the guidelines established in the previous chapter. The chapter is structured to first introduce the comparison of monthly coalition coordination cell (CCC) data to figures extracted from the TPFDD using passenger/cargo lenses and supported by the primary descriptive statistics of the study. From there, the study will consider the cumulative passenger and cargo numbers across the time frame of the data, focusing on the delta between the CCC and TPFDD figures specifically in terms of the hypothesis from chapter III. Finally, the analysis will translate raw cargo and passenger numbers into airframe equivalents to help illustrate the potential impact of unaccounted requirements on operations planning, wrapping up by addressing research questions.

Comparison of Monthly Data

Comparing CCC data to corresponding numbers from the TPFDD, it is immediately evident that there is a drastic difference between the two samples. As illustrated in Figure 5, the number of passengers moved according to the CCC is consistently higher than those of the TPFDD on a month-to-month basis. Although there is no discernable trend in the fluctuation of the monthly difference between the two data sets, that difference ranged from a low delta of 364 passengers in August of 2010 to a high of 7056 passengers in April of the same year. To further illustrate monthly differences, in December the number of passengers tracked by the CCC was 98% higher than those from TPFDD in the same month. Even in the most accurate month, September 2010, there was still a 23% difference between the data sets. In all cases, the monthly totals from the

CCC's "actual" data were higher than those reflected in the TPFDD. This is illustrated in the monthly average number of passengers moved according to the CCC data versus the monthly average of the TPFDD, 3115 and 982 passengers respectively for an average difference of 2133 (65% difference) per month.

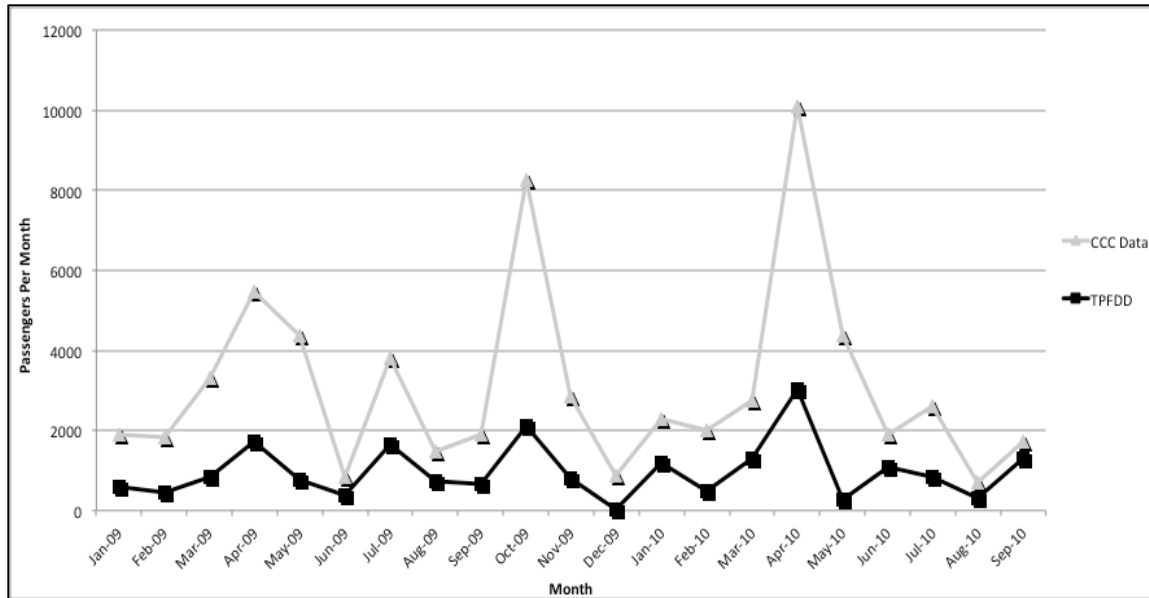


Figure 5: Coalition Passengers Moved Per Month (CCC VS TPFDD)

Similar information can be surmised from the corresponding number of cargo short tons moved according to each data set (see Figure 6). Compared to a CCC monthly average number of short tons of 554.98, the TPFDD tracked only 432.88, a monthly average 10% difference of 122.10 short tons. Much like the passenger data, no readily apparent trends exist in the monthly differences. As a matter of fact, the cargo data was different in that the CCC actuals were not always higher than the TPFDD. During six months of the year, the TPFDD numbers were actually higher than those from the CCC. While virtually impossible to ascertain why the TPFDD is higher in some cases, it is

possible that there was a lag in tracking earlier movements that materialized in subsequent months. Nonetheless, the CCC data never matched exactly with the TPFDD. At best, there was a 3% difference between the quantities, at worst a 140% difference.

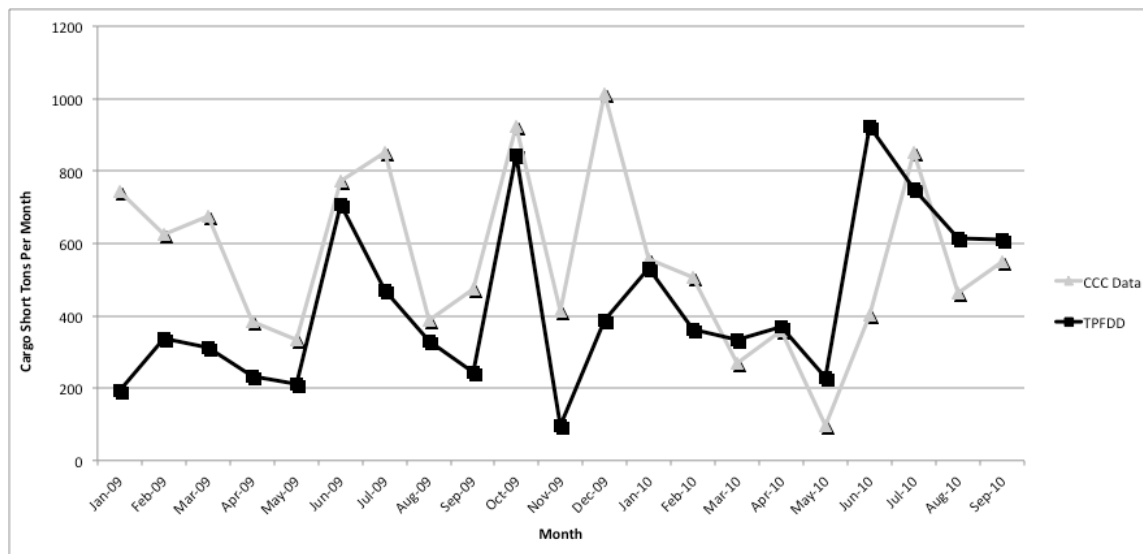


Figure 6: Cargo Short Tons Moved Per Month (CCC VS TPFDD)

Together, the monthly CCC data and TPFDD set analysis for both cargo and passengers illustrate that there is a quantitative difference between the two sources. what the CCC is tracking through its direct customer interface with coalition partners

Comparison of Cumulative Data

If the monthly data comparison shows that there is an inconsistency between the actual numbers as reported by the CCC and those figures in the TPFDD, a comparison of cumulative data will support the direction of that inconsistency in line with the first hypothesis. Additionally it will help to give an indication of the magnitude of the problem. Starting with cumulative passenger numbers, Figure 7 displays a consistently

growing delta between the CCC and TPFDD numbers. This culminates at the end of 21 months of data with a difference of 44,790 passengers, that is the TPFDD accounting for only 20,625 of the CCC's 65,415 passengers. In short, the TPFDD reflects nearly 68% passenger movements as unaccounted for (see Figure 8).

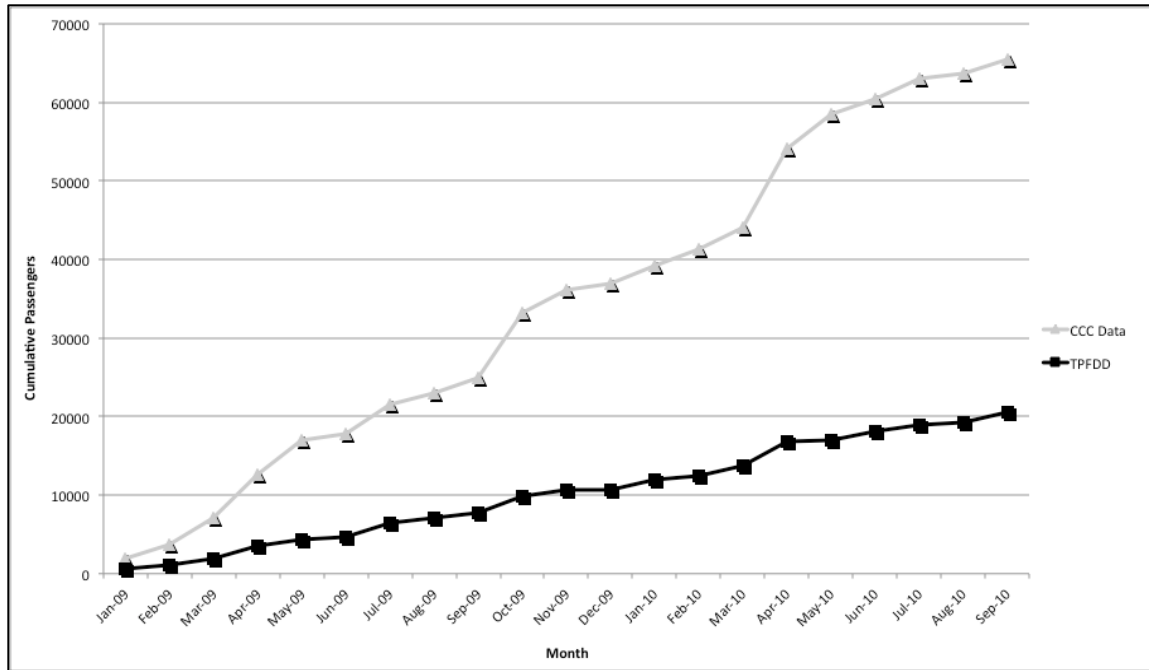


Figure 7: Cumulative Passengers Moved (CCC VS TPFDD)

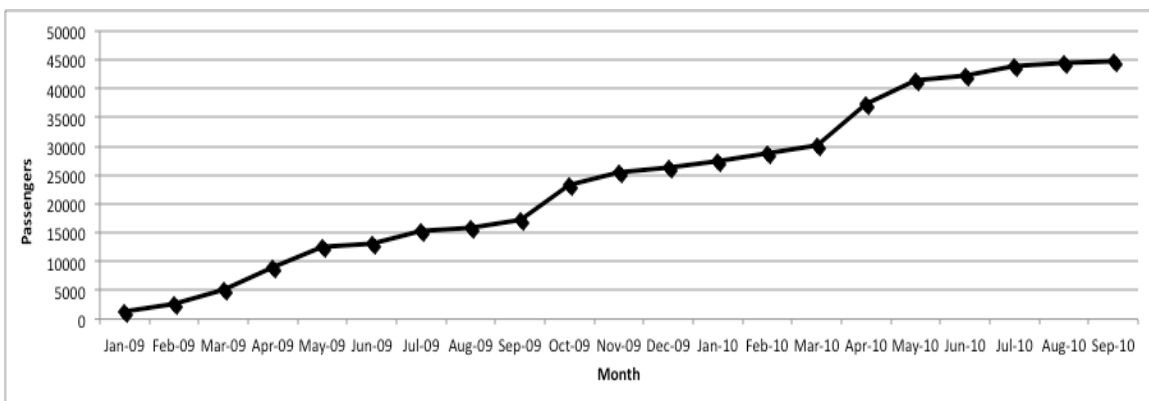


Figure 8: Cumulative Unaccounted Passengers

In terms of a percentage gap, the cargo numbers fair a bit better than the passenger ones. Even though the worst month is indicated by CCC data that is almost 74% higher than the TPFDD, that gap (while fluctuating) ultimately dropped by about 50% (see Figure 9). This is likely due to the higher monthly numbers noted in the previous section, but remains difficult to fully explain. Although the gap does close a bit in some of the latter months, the ultimate result is still a delta of 2564.1 short tons of cargo, ending with CCC cargo totals that are 22% higher than TPFDD totals (see Figure 10).

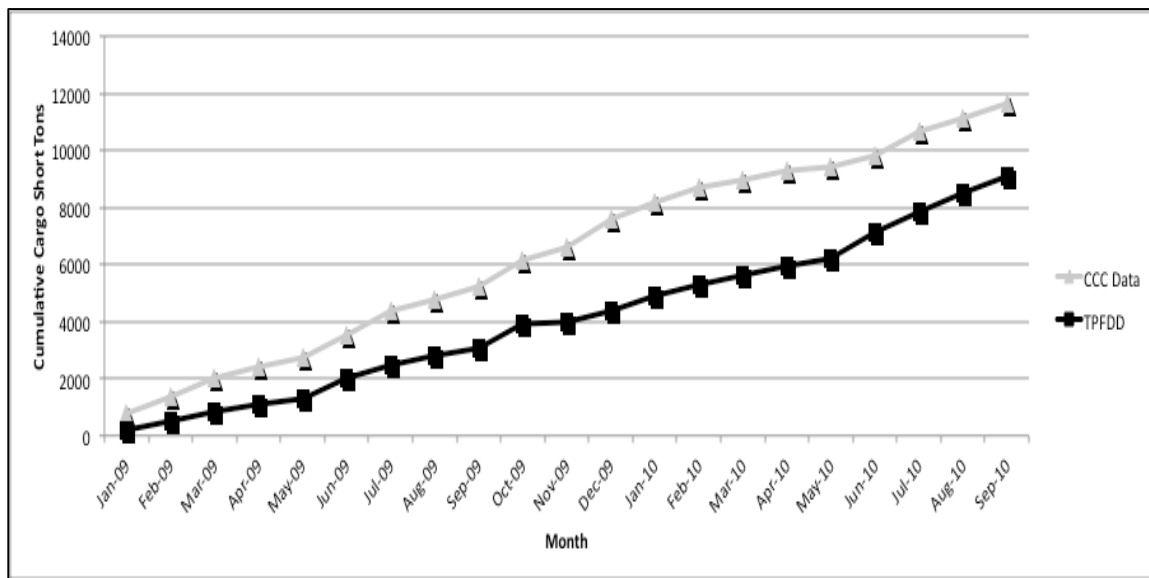


Figure 9: Cumulative Cargo Short Tons Moved (CCC VS TPFDD)

Just as the month-by-month data analysis numbers suggest that a majority of the months in the data sample (when taken individually) see different movement totals between the data sets, the cumulative data complement that suggestion with evidence of consistently higher collective totals that end with greater total for cargo and passengers. The former allows rejection of the null hypothesis. The latter supports the alternative

hypothesis that the sum total of TPFDD movements in terms of cargo and passengers are less than the totals from the CCC's actual data.

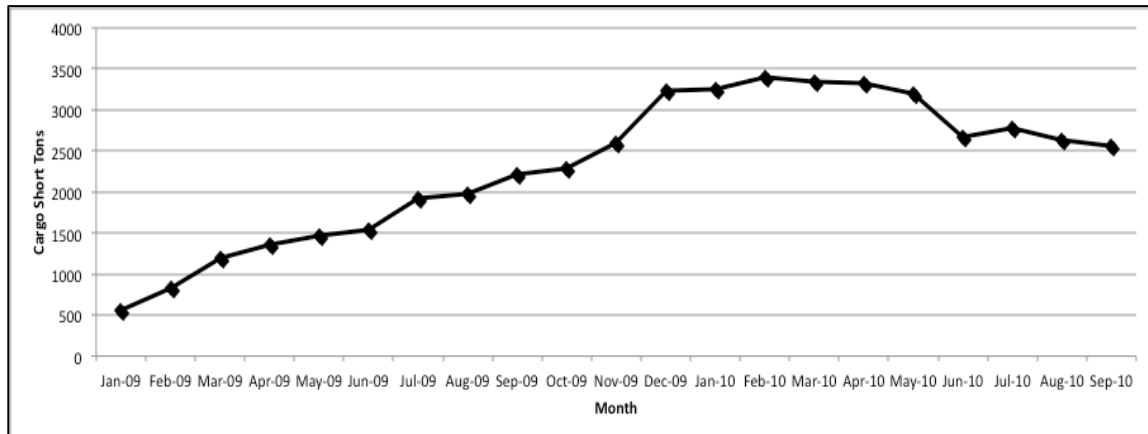


Figure 10: Cumulative Unaccounted Cargo Short Tons

Translation to Airframe Equivalents

The preceding data analyses are facilitators for the translation of raw cargo and passenger numbers into airframe equivalents. While it is virtually impossible to predict the infinite number of cargo and passenger configurations on each of these aircraft, using the generally accepted load planning factors from 10-403 described in chapter III provides a reasonable estimate of the burden put on the airlift force. As the primary cargo carriers, converting these numbers to C-17, C-130 and C-5 cargo loads helps to paint a picture that is more hard hitting to airlift planners at TRANSCOM and AMC. Table 2 represents three different contexts in which to put the data.

The first set of numbers is a translation of the total unaccounted for missions for the 21-month duration of the raw data as explained in the previous section. It shows that 2564.1 short tons of cargo require 57 C-17 missions to move (and 214 C-130 missions,

etc.). It also converts the passengers not accounted for by the TPFDD to 491 C-17 missions, keeping in mind that a portion of the 44,790 passengers can be carried on some of the cargo missions for both C-17's and C-5's. From January of 2009 through September of 2010, the unaccounted for cargo and passengers amount to a sum total of 548 C-17 equivalents, 774 C-130's or 878 C-5 missions.

The second number set gives planners an understanding of the number of mission equivalents that would be required to move the additional cargo and passengers from the CCC data in one year. This annual requirement is based on the average monthly gap between CCC and TPFDD for passengers and cargo multiplied by 12 months. The result is 313 C-17 missions, 442 C-130 and 502 C-5 missions per annum.

A deeper level of granularity can be seen in the third set of numbers as they provide estimated coalition airlift requirements per month. Once again, these calculations are based on the 2133 passenger and 122.1 short ton averages explained by the monthly data section above. These cargo and passenger totals equate to 26 C-17's, 37 C-130's or 42 C-5's.

Table 2: Unaccounted Mission Totals by Airframe

		C-17	C-130	C-5
Total Unaccounted Missions (Jan 09 - Sep 10)	<i>Passenger</i>	491	560	836
	<i>+ Cargo</i>	57	214	42
	<i>Total</i>	548	774	878
Annual Unaccounted Missions (based on monthly cargo/pax averages x 12)	<i>Passenger</i>	280	320	478
	<i>+ Cargo</i>	33	122	24
	<i>Total</i>	313	442	502
Monthly Unaccounted Missions (based on monthly cargo/pax average)	<i>Passenger</i>	23	27	40
	<i>+ Cargo</i>	3	10	2
	<i>Total</i>	26	37	42

Research Questions Addressed

In response to the first research question, the departure from established methods of tracking U.S. airlift usage data appears to result in a less than complete data picture for coalition airlift. In short, there is no established method of tracking coalition movements similar to that used for the U.S. Unlike U.S. movements, coalition movements are not subject to the rigorous in-transit visibility standards tied to TPFDD inclusion such as those described in the literature review, nor do they have access to the same movement infrastructure (i.e. organizations, systems, personnel, etc.) The manifestation of these different requirements and lack of access is the parallel generation of data in two different tracking systems for coalition movements, namely the CCC spreadsheet and the TPFDD. The vast numerical difference in monthly and cumulative cargo and passenger reported in this analysis are indicative of a data integrity issue resulting from the stove piped CCC and TPFDD sources.

To address question two, the answer to the first question shows that (in the context of coalition airlift) there is a data integrity issue with the TPFDD. Because the inaccurate TPFDD is used as the baseline data for programmatic studies to determine airlift estimates (specifically the MCRS), those airlift estimates are suspect. If the TPFDD does not include the entire coalition airlift requirement as has been shown, that requirement cannot be accurately represented in subsequent airlift estimates or programmatic airlift studies.

Answering question three requires taking this conclusion one step further. It has been established that there is a data integrity problem with regard to coalition airlift movements and that programmatic studies based on those numbers are questionable.

Because TRANSCOM uses its MCRS as a basis for future planning, it can be concluded that any of the associated mobility requirements or budgets do not include the complete coalition airlift requirement. Therefore USTRANSCOM is inaccurate in their portrayal of the total airlift requirement.

V. Conclusions and Recommendations

Conclusions

To pick up where the last chapter left off, the data has clearly demonstrated the discrepancies between coalition cargo/passenger movements in the TPFDD and the CCC data. The obvious impact in utilizing historical TPFDD numbers as the basis for future airlift projections is that USTRANSCOM would be underestimating the number of aircraft required to facilitate coalition moves. This could manifest itself in misjudged aircraft acquisition requests and/or underfunded mobility budgets. The less obvious (and potentially more detrimental) second-order effects of that underestimation become evident when considering them against the backdrop of the planning considerations and implications discussed in the literature review. This airlift shortage could lead to two possible outcomes: failure of the transportation system to meet the Geographic Combatant Commander's timeline for TPFDD closure and/or the inability of U.S. airlift assets to support coalition movement.

As shown in Joint Publication 3-17, the failure of the transportation system to meet appropriate time criteria has the potential to jeopardize overall COCOM mission objectives (Department of Defense, 2009). Because the TPFDD is the COCOM's prioritized timeline of force movements that drives force closure, it is critical that it be complete and accurate. As part of USTRANSCOM's statutory requirement to determine movement (TPFDD) feasibility, it needs to employ (as Jackson suggests) the "best data available" (Jackson, 2009). Without complete information, airlift planners, whether in the COCOM staff or at USTRANSCOM, are incapable of making informed decisions to establish airlift priorities within the TPFDD. As such, it is the responsibility of the GCC

to demand information integrity as much as it is TRANSCOM's responsibility to use that information to determine transportation feasibility. With a "best case" of total supportability of all requirements, the "worst case" is the inability of the DTS to support the total airlift requirement, thereby jeopardizing the mission.

Against the backdrop of coalition operations, feasibility of transportation could ultimately come to a decision to (mutually exclusively) support U.S. *or* coalition movements. Martin's contention that this type of US logistics support bolsters multinational participation in contingency operations (Martin, 2007) coupled with Tago's suggestion that common transportation is a prerequisite for some countries to join a coalition does not bode well if there is an airlift shortage (Tago, 2007). By inaccurately projecting airlift requirements, TRANSCOM could potentially discourage larger coalition involvement in any contingency. Although multinational support of an operation is not necessarily a precondition of operational success, it can be an underpinning of international relations, foreign policy and multinational backing of U.S. operations.

Possible Discrepancy Causes & Solutions

One of the main themes of multinational and logistics doctrine described the critical nature of positive communications between coalition partners. In an e-mail exchange with CCC personnel, they explained a non-standard coalition airlift request and execution process that (depending on the nation) could involve a variety of different players and methods. This could include third country nationals, embassy representatives, COCOM liaisons, TRANSCOM representatives, JDDOC partners and aerial ports using systems such as SMS, GATES, JOPES, ITARS, DCAPES, etc. in order to plan and close moves. The concerning revelation of this partner/system coordination is the CCC's admission

that when it comes to binding, regulatory guidance, “There is no actual doctrine”. (CCC, 2010) Similar comments came out of TRANSCOM as they were “. . . not aware of any specific references on coalition movements” (USTRANSCOM, 2010). Despite the litany of U.S. DoD, NATO and Allied publications that provide detailed airlift and logistics planning guidance, no countries are obligated to follow it.

Not only is this true for information sharing across multinational lines, but also true within U.S. confines, as there is no standard for the inclusion of coalition airlift requirements in the TPFDD. The very structures espoused by Joint Publication 4-08 such as the creation of Combined Air Operations and Joint Movement Centers, as well as TRANSCOM’s creation of the JDDOC are based on extensive logistics experience and have been comprehensively applied for Joint U.S. use (Department of Defense, 2002). At the same time, coalition operations have not been integrated into that system. As a result, system users (coalition users, for example) are held to differing sets of standards that undermine those structures intended to integrate and synchronize theater deployment. Even when the CCC gets comprehensive data on coalition moves, because there is no regulatory requirement to do so, that information is not necessarily provided to the appropriate CENTCOM directorate (i.e. CDDOC or J3/J4) to ensure it is reflected in the TPFDD. The outcome, according to the CCC, is that “some (moves) are in the TPFDD and some are not” (CCC, 2010).

To resolve these issues, TRANSCOM and the GCCs need to collaborate on the authoring of regulatory guidance that codifies the doctrinal philosophies of existing DoD and multinational doctrine. Just as Joint Publication 4-0 warns of the challenges associated with understanding procedures for multinational interoperability, the system of

coalition airlift requests needs to be standardized to clearly define communications structures, procedures and expectations (Department of Defense, 2008). The JDDOC template indicates excellent *suggestions* as to what DDOC and other planners *should* do, but these suggestions are not mandated and are subsequently watered down or disregarded. Guidance needs to be binding for coalition partners and require minimal informational requirements in order to request movement. If it is not *politically* feasible to make countries adhere to standards of information sharing, at the very least, an organization should be assigned responsibility to track coalition movements for after the fact inclusion in programmatic mobility studies.

Coalition members need to be able to provide comprehensive movement information to U.S. air planners in order to facilitate end-to-end visibility via the TPFDD and other movement tracking systems. This could help to bring coalition nations in line with the JDDE concept explained in the literature review. The universal utility of the “. . . complex of equipment, procedures, doctrine, leaders, technical connectivity, information, shared knowledge, organizations, facilities, training, and materiel necessary to conduct joint distribution operations . . .” would then be used to benefit coalition members as it has the U.S. DoD (Department of Defense, 2007). Multinational participation in the JDDE could streamline information transfer between international partners and the U.S. while creating an accountable standard for the many supporting parties mentioned above (i.e. liaisons, embassy personnel, etc.) The successful U.S. airlift movement system can only work for multinational players if standards are equally enforced.

Needless to say, however, the U.S. needs to clarify and codify its own *internal* procedures for handling coalition movements. As the U.S. learned some hard fought

lessons regarding cargo and passenger movement visibility during Desert Storm, those same lessons learned (that led to associated ITV standards for Joint movement) need to be enforced for coalition movements (Matthews & Holt, 2002). If the failure of one U.S. DoD organization to share validated information about a U.S. move with TPFDD planners is unacceptable, the same should be true for coalition movements. This appears to be the case with the current system as one group had the complete movement data about coalition moves but did not have the communications structures or regulatory requirements in place to facilitate the sharing of that information with TRANSCOM. Internally, U.S. DoD coalition planners need to be required to provide any pertinent movement data for TPFDD inclusion in the same manner it is required for U.S. movements.

Recommended Future Research

This study was limited by its inability to share classified information. Fully classified research could utilize specific MCRS algorithms in order to make a more pinpoint recommendation on aircraft acquisitions decisions. Using the more involved MCRS calculations could facilitate an investigation into a more precise determination of coalition requirements in the exact terms of the MCRS, namely metric ton miles per day. In turn, this could support the ability of the MCRS models to smooth coalition requirements into total requirements through creative scheduling, thereby limiting overall burden on the system.

In addition, there is a distinctly financial aspect of providing airlift or other logistics support to coalition partners. If USTRANSCOM is unsure of the actual coalition airlift requirement in terms of passengers and cargo, there is a reasonable chance that this blind

spot extends to the billing aspects of those movements. There is an opportunity to take a closer look at the cost of providing airlift and air mobility support versus what coalition users are being charged.

Another possible study could include research intended to undertake a cost benefit analysis of coalition participation. This would require a quantitative analysis of the cost associated with providing airlift or other logistics support using airlift numbers like the ones in this study as a springboard. The likely more difficult analysis would involve assigning quantitative values to multinational participation in terms of international relations and/or international support. In turn, the two could be compared to determine if it is truly “worth” fighting with a coalition of the willing.

Finally, this study was limited to the CENTCOM area of operations. It would be of note to do a similar study across all of the GCCs to determine what their numbers look like. The subsequent findings could be contrasted with this research in order to determine if there are similar issues elsewhere and if not, what are the behaviors and/or structures that facilitate more accurate reporting.

Summary

In conclusion, this research answered the USTRANSCOM query in terms of its topic proposal. In short that question was “how big is the coalition airlift requirement”. While the quantitative answer to that question may not comprehensively get at the root cause of why there is such a discrepancy between data sets, it is a clear signal to planners of the competing requirements generated by coalition airlift requirements. As the U.S. government continues global operations in pursuit of National Security Strategy goals, coalition forming can only grow in importance. The philosophical understanding of, and

doctrinal approach to, what needs to be done already exists, now it is a matter of employing that knowledge to close the planning gap with coalition partners to enable informed airlift decisions.

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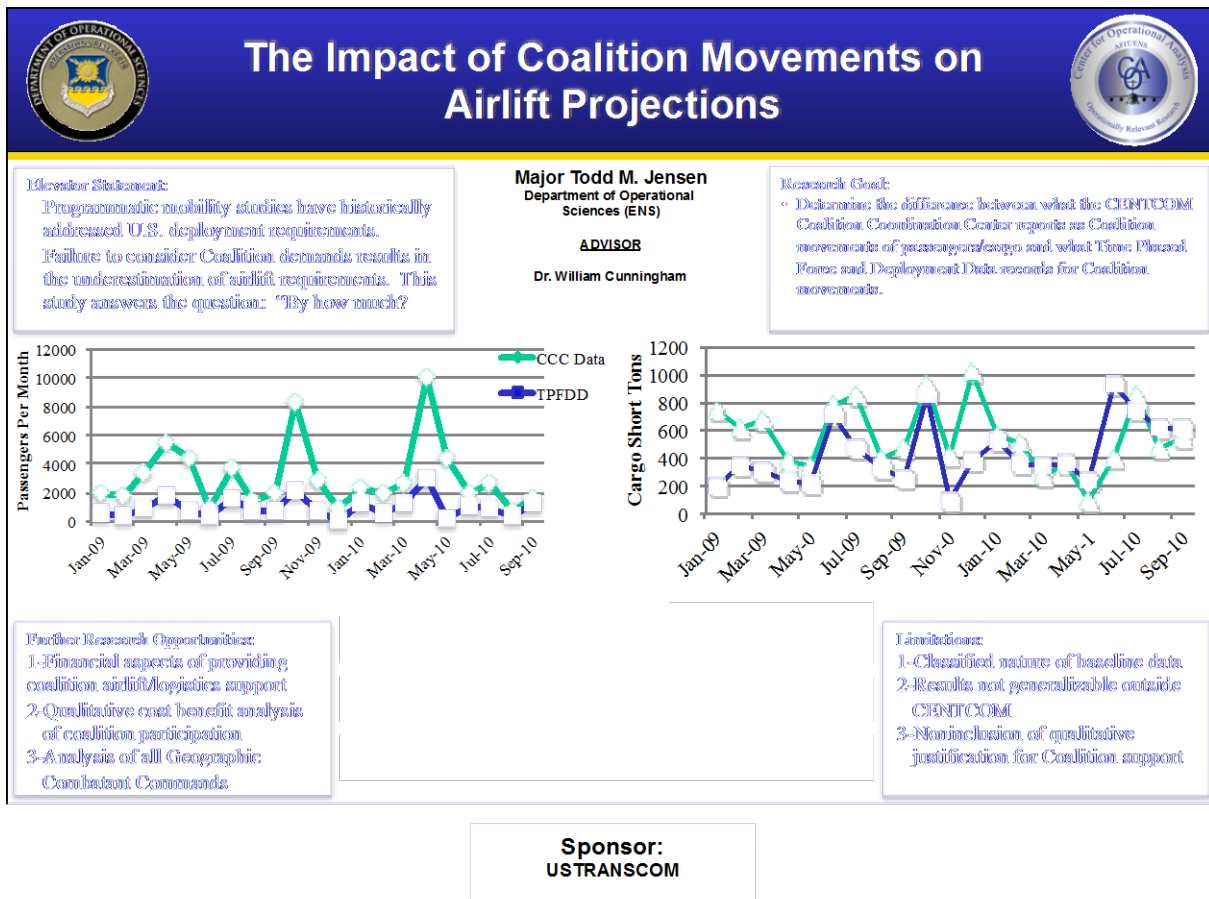
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Appendix A. Blue Dart

Contingency operations in Central Command will continue into the foreseeable future. The solicitation of multinational participation in these operations pursuant to U.S. National Security Strategy objectives comes with a cost: The logistics burden of multinational operations typically falls on the Department of Defense. As a primary provider of mobility airlift, the United States Transportation Command is critical to operational logistics, including coalition support. With the high likelihood of sustained/increased U.S. support, mission success requires coalition logistics/airlift needs to be included in USTRANSCOM planning models. As a source of historic airlift information, Time Phased Force Deployment Data is a key input to USTRANSCOM models.

Comparing historic coalition movement data provided by the Central Command Coalition Coordination Center against the TPFDD for the same period, this study investigates the accuracy of USTRANSCOM studies in light of airlift requirements of coalition partners. The subsequent analysis indicates that current studies do not account for coalition requirements. Consequently, it is suggested that USTRANSCOM take an approach to tracking coalition airlift in accordance with existing doctrine. That approach should extend organizations, structures and systems (use to ensure accurate U.S. airlift tracking) to coalition operations, thereby assuring use of a complete airlift picture to predict future requirements.

Appendix B. Quad Chart



Vita

Major Todd M. Jensen graduated from Ygnacio Valley High School in Concord, California in 1994. He entered undergraduate studies at the University of Arizona in Tucson, Arizona where he graduated with a Bachelor of Arts Degree in English Literature in May of 1998 and was commissioned through Air Force Reserve Officer Training Corps Detachment. He also holds a Master of Science Degree in Public Administration from Central Michigan University.

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